

Remarks

Claims 4-12 are pending. Claims 4, 7 and 10 have been amended to clarify that controlling the partial pressure is applied during the heating process. Support may be found in paragraph [0016] of the Applicants' Specification.

Claims 4, 7 and 10 stand rejected under 35 USC §102(b) as anticipated by Jurmann, which discloses an annealing process including a deoxidizing pre-treatment and a pickling step. The rejection asserts that Jurmann's disclosure of oxygen purging is the equivalent of lowering the partial pressure of steam to less than about 1×10^{-5} .

The Applicants respectfully submit that the rejected claims are not anticipated by Jurmann. Jurmann discloses a method to reduce formation of boron oxide by a deoxidizing treatment of the raw steel in an "upstream heating chamber having an independent protective gas atmosphere separated from the annealing unit." (See Jurmann, col. 2, lines 9-14.) Jurmann further teaches that this deoxidizing treatment is a pre-treatment step which occurs prior to moving the metal to an annealing furnace. (See Jurmann, col. 2, line 31.)

The pre-treatment step comprises purging the oxygen from an upstream chamber by flushing the system with nitrogen or argon, then subjecting the metal to a pickling bath or induction heating to deoxidize the surface of the metal. Jurmann teaches that purging oxygen from the system merely prevents oxidation following the deoxidizing pre-treatment step, and does not teach that the step of purging oxygen from the system is responsible for preventing boron oxide formation. (See Jurmann, col. 2, line 31.)

In sharp contrast, Claims 4, 7 and 10 do not recite the oxygen-free pickling or induction heating pre-treatment steps that Jurmann requires. Instead, those claims recite methods to reduce

boron oxide formation comprising a step in which the partial pressure of steam within a bright annealing furnace generating a boron oxide is reduced to a value less than about 1×10^{-5} . The Applicants' Specification teaches that formation of boron oxide may be prevented by decomposition of hydrocarbon or carbon component and reduction and oxidation reactions with water and oxygen residing in the furnace. These reactions are responsible for reducing the dew point and steam partial pressure of the furnace and creating an internal environment that inhibits formation of boron oxide. (See paragraphs [0022] and [0025] and Formula 1 of the Applicants' Specification.)

Thus, the Applicants respectfully submit that Claims 4, 7 and 10 are distinguished from Jurmann because Jurmann teaches preventing and controlling formation of boron oxide by subjecting metal to deoxidizing pre-treatment, such as pickling, and not by lowering the partial pressure of steam in the furnace to less than about 1×10^{-5} . Jurmann merely discloses purging oxygen from a pre-treatment chamber and does not teach or suggest a partial pressure of steam in a furnace of less than about 1×10^{-5} or a means to achieve this partial pressure.

Furthermore, Jurmann is distinguished from Claims 4, 7 and 10 because it teaches a method performed in a pre-treatment chamber. In contrast, Claims 4, 7 and 10 reduce boron oxide formation by altering the internal environment of the annealing furnace itself and does not require a pre-treatment chamber. Thus, Claims 4, 7 and 10 recite a location for performing a method to control or prevent boron oxide formation that further distinguishes over Jurmann.

The Applicants' claims also recite that the step of controlling the partial pressure of the steam is applied during the heating process in the annealing furnace. Jurmann does not disclose controlling the partial pressure of the steam within the annealing furnace where the strip is heated.

In light of the foregoing, the Applicants respectfully submit that Jurmann fails to disclose each and every element of those rejected claims because it teaches a method that differs from those rejected claims in both the process and location of the steps. Accordingly, reconsideration and withdrawal is respectfully requested.

Claims 5, 6, 8, 9, 11 and 12 stand rejected under 35 U.S.C. §103(a) as being obvious over Jurmann in view of JP '620. The rejection states that Jurmann fails to disclose the features of the rejected claims and relies on JP '620 for teaching the use of carbon and hydrocarbons inside a furnace to prevent oxidation and decarburization of steel strips.

The Applicants respectfully submit that those claims are not obvious in view of the combination of Jurmann and JP '620. The abstract of JP '620 discloses a method in which a furnace is heated to 723 °C and gaseous hydrocarbon is added to a furnace if an oxygen sensor detects that the partial pressure of oxygen in the unit has exceeded a target value. JP '620 does not disclose the target value of the partial pressure of oxygen in the furnace, nor does JP '620 teach or suggest a partial pressure of steam.

In light of the mere disclosure of use of a hydrocarbon to control partial pressure of oxygen in the abstract of JP '620, the Applicants respectfully submit that JP '620 fails to cure the deficiency of Jurmann with respect to disclosure of a partial pressure of steam in the furnace of less than 1×10^{-5} . Accordingly, the Applicants respectfully submit that Claims 5, 6, 8, 9, 11 and 12 are not obvious in view of the combination of Jurmann and JP '620. Reconsideration and withdrawal is respectfully requested.

In light of the foregoing, the Applicants respectfully submit that the entire Application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,



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